REMARKS

The Examiner has rejected claims 39-42 under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. Claims 1, 5-7, 22, 25 and 35-42 are rejected under 35 U.S.C. § 103 as being unpatentable over PL 149319 in view of CN 1060052. Claims 35-42 are rejected under § 103 as being unpatentable over EP 465861 in view of CN 1060052. Claims 22, 25 and 35-42 are rejected under § 103 as being unpatentable over CN 10600512, and as being unpatentable over SU 1706816 in view of CN 1060052. Claims 1, 5, 22 and 35-42 are rejected under § 103 as being unpatentable over Joseph U.S. Patent No. 3,674,471.

Rejection under § 112, ¶1

Applicants respectfully traverse. Support for claims 39-42, which were added in the amendment dated May 31, 2005, may be found at page 19, lines 4-7 of the parent application (Application No. 10/226,672, incorporated by reference), which recites that "brazing may be accomplished without the use of a flux." If there is no flux, then the brazing component is "fluxless," which is a term commonly used in the art. In the present application, at page 11, line 10, it is stated that the brazing component is heated "to cause the alloy to wet and flow between the two metal parts, with flux if necessary, ..." This makes clear that the brazing components may or may not include flux, thereby providing support for brazing components with flux and for brazing components without flux, i.e., fluxless brazing components. Thus, the present application and the parent application, which is incorporated by reference, are not silent as to the

presence or absence of flux, but rather, expressly contemplate the presence or absence of flux. It is therefore respectfully requested that the rejection under § 112, ¶1 be withdrawn.

Rejections under § 103

Examiner is advised that the form paragraph regarding joint inventors that appears on Page 3 of the Office Action is inappropriately included in the instant case, which has always named a single inventor.

Rejection under § 103 over PL 149319 in view of CN 1060052

In the Supplemental Response dated August 31, 2005, Applicant submitted extensive arguments and supporting evidence of inoperability of PL 149319 ("the Polish Abstract"), and yet, Examiner's Response to Arguments on pages 7-8 of the instant Office Action does not include any explanation of why such arguments and supporting evidence were insufficient to show inoperability of the reference. If inoperability is established, the reference is not effective as prior art against the instant claims. Applicant again asserts the arguments presented at pages 8-9 of the Response dated August 31, 2005, i.e., that the teachings of the Polish Abstract cannot be duplicated, i.e., a copper components cannot be brazed using the brazing paste disclosed therein. Applicant presented evidence for the specific example provided in the Polish Abstract as well as for other brazing pastes that fall throughout the broad ranges disclosed therein. Thus the reference has been shown by a preponderance of the evidence to be inoperable, and Applicant respectfully requests that all rejections over the Polish Abstract, alone or in combination with another reference, be withdrawn. Further, if the evidence is deemed by

the Examiner to be insufficient, Examiner is required to provide an explanation in support of that position so that Applicant may have the opportunity to respond.

As further evidence of inoperability of the Polish Abstract and non-obviousness in view thereof, Applicant submits herewith another affidavit from Mr. Robert Henson and supporting evidence to show that in the absence of the carrier, such that the powder is not formed into a paste, the powder alone cannot be brazed, either above or below the temperature of 973K (1292°F) indicated by the reference. More specifically, Mr. Henson prepared a powder of the Cu alloy example provided in the Polish Abstract, referred to as Powder A, and attempted to form a braze in a copper T-Joint (note that the Title of the Polish Abstract is "Brazing paste for copper components" such that copper components were used for the braze tests). The solid powder would not melt until close to the melting point of the copper parts being brazed (melting point of copper is 1980°F), and even then, the melted powder did not flow into the capillary. The two copper parts were not joined together by the braze material to form the T-Joint. The Polish Abstract states that the paste (containing 50-95 wt.% Cu alloy powder and 5-50 wt.% methyl cellulose/glucose/water Carrier) permits brazing below 973K. In the First Affidavit of Robert Henson (filed August 31, 2005), Applicant showed that the paste containing the Cu alloy powder + Carrier could not be used to braze copper components either below 973K, as claimed therein, or above 973K, and this was shown for alloy compositions throughout the broad range disclosed therein as well as for the specific example provided therein. Thus, the reference is inoperable.

The reference does not teach or suggest that the brazing of copper components may be accomplished without the Carrier, i.e., with the powder alone instead of in paste form. The Third Affidavit of Robert Henson (filed herewith) proves that the specific Cu alloy powder disclosed in the Polish Abstract, alone in powder form, cannot be used to braze copper components despite the Examiner's assertion that it would be within the skill of the ordinary artisan to omit the Carrier and simply braze at a higher temperature (note that the "paste" cannot be omitted because the paste includes the Cu alloy powder–the Examiner is presumed to be referring to eliminating the Carrier such that the Cu alloy powder is not converted to paste form for brazing.) Thus, the Polish Abstract does not teach or suggest a fluxless solid brazing component.

In the last response, Applicant submitted significant supporting evidence to show that the alloys disclosed in the broad range of the Polish Abstract (but falling outside the claimed scope) cannot simply be converted to the solid forms recited in Applicants claims by omitting the Carrier. The evidence showed significant difficulty with extruding the alloys into wire form and with subsequent use of the wires for brazing. It is Examiner's position that the Polish Abstract discloses a solid form, namely powder, and that CN 1060052 (the Chinese Abstract) discloses that a brazing solder component can be formed into rods, ingots, strips, or powder, and based on this combination, it would be mere design choice to form the brazing component into the desired form without the paste and carrier, absent evidence of non-obviousness. First, the Chinese Abstract does not disclose a brazing solder component. The Chinese Abstract discloses a solder

composition. By definition, a solder alloy has a liquidus temperature below 840°F and a brazing alloy has a liquidus temperature above 840°F. By disclosing a solder composition, the Chinese Abstract implies that the composition has a liquidus below 840°F. All claims of the present invention claim a brazing component having a liquidus temperature above 840°F. Thus, the claims are limited to brazing alloys, not solder alloys. Furthermore, all claims include either "consisting essentially of" or "consisting of" as the transitional phrase, and thus preclude the Zr, Ti, Ce and Zn elements in the solder compositions of the Chinese Abstract. As explained previously, these elements materially affect the basic and novel characteristics of the alloy, including its temperature profile and malleability, such that the solder compositions may have properties that enable the composition to be formed into the claimed solid components, but it does not follow that the brazing compositions of the present invention could likewise be formed into the same solid components. Second, in applicants prior responses, evidence was provided that the form of the brazing component is not mere design choice, but rather is dependent on composition. That evidence has not been accorded proper weight. Applicant tested alloys throughout the range disclosed in the Polish Abstract, including attempting to form the alloys into one of the recited forms. It was shown that variations in the composition of the brazing alloy have an effect on the ability to form a solid component, and that some of those alloys could not be formed into rod/wire at all, while others could not be formed into rod/wire in a commercially viable process. See Second Affidavit of Robert Henson and pages 11-12 of the Response dated August 31, 2005. With respect to Alloy F, while it falls within the scope of claim 1, it also falls

outside the scope of other claims, for example, claims 35 and 39, which contain the proviso that the sum of tin and antimony does not exceed 10 wt.%. Thus, alloy F was tested for the purpose of showing the criticality of the combined content of tin and antimony. With respect to Alloys I, J and K, these alloys also fall within the scope of claims 35 and 39, and are intended to show the criticality of the P and Sn ranges.

In addition, in Table A, which is again attached hereto, Applicants have provided substantial evidence to show the effect of composition on the liquidus and solidus temperatures and the major thermal arrests. This constitutes evidence that the claimed liquidus, solidus, and thermal arrest temperatures are not inherently possessed by the material disclosed by the Polish Abstract

In view of the above remarks, together with the attached Table and Affidavit and the previous Responses and Affidavits, Applicant respectfully requests removal of the Polish Abstract as a reference due to inoperability thereof, and withdrawal of all rejections for obviousness over the Polish Abstract in view of the Chinese Abstract.

Rejection under § 103 over EP 465861 in view of CN 1060052

Regarding claims 22 and 25, EP 465861 does not teach or suggest the inclusion of Ni in any amount, let alone in the amount claimed. The Chinese Abstract discloses a solder composition, not a brazing alloy, and thus does not teach or suggest modifications to a brazing alloy. Evidence has been submitted to show the effect of Ni on the composition, and this is simply not taught or suggested by the references.

With respect to claims 35-42, EP 465861 does not teach or suggest the claimed forms of the brazing components, nor the temperatures for the solidus, liquidus and major thermal arrest. As shown by the ample evidence submitted to date, variations in composition have a marked affect on the temperature profile. Thus, applicant has proven that the claimed properties are not inherent in the broad teachings of the prior art. Further, the Chinese Abstract does not teach or suggest modifications to the composition or forms of a brazing alloy since it is directed to solder compositions. It is therefore respectfully requested that the rejection of claims 22, 25, and 35-42 over the EP 465861 in view of the Chinese Abstract be withdrawn.

Rejection under § 103 over SU 1706816 in view of CN 1060052

SU 1706816 (the Russian Abstract) discloses changes in the shrinkage porosity and strength of a braze joint by the inclusion in the braze alloy of 0.5-1.5 wt.% In and 1.0-4.5 wt.% Si. The present invention claims a brazing component made of an alloy "consisting essentially of" or "consisting of" P, Sn, Ni, Ag, Si, Sb and Mn. By the transitional phrase "consisting essentially of," the inclusion of In is precluded if it materially affects the basic and novel characteristics of the alloy. The Russian Abstract admits that the inclusion of In has an affect on at least two material properties of the alloy. By the transitional phrase "consisting of," the inclusion of In is precluded, period. Therefore, the claimed invention is not obvious in view of the Russian Abstract. Further, as fully explained above, the Chinese Abstract is not directed to a brazing alloy, and thus provides no teaching or suggestion regarding the solid forms into which a brazing alloy, such as that set forth in the Russian Abstract, may be formed. It is therefore

respectfully requested that the rejection of claims 22, 25, and 35-42 over the Russian Abstract in view of the Chinese Abstract be withdrawn.

Rejection under § 103 over CN 1060052

The Chinese Abstract does not disclose a brazing component. The Chinese Abstract discloses a solder composition. By definition, a solder alloy has a liquidus temperature below 840°F and a brazing alloy has a liquidus temperature above 840°F. By disclosing a solder composition, the Chinese Abstract implies that the composition has a liquidus below 840°F. All claims of the present invention claim a brazing component having a liquidus temperature above 840°F. Thus, the claims are limited to brazing alloys, not solder alloys. For this reason, the claimed brazing alloys are not taught or suggested by the solder alloys in the Chinese Abstract. Furthermore, all claims include either "consisting essentially of" or "consisting of" as the transitional phrase, and thus preclude the Zr, Ti, Ce and Zn elements in the solder compositions of the Chinese Abstract. As explained previously, these elements materially affect the basic and novel characteristics of the alloy, including the temperature profile and malleability, such that the solder compositions may have properties that enable the composition to be formed into the claimed solid components, but it does not follow that the brazing compositions of the present invention could likewise be formed into the same solid components. Moreover, the Chinese Abstract discloses two types of solders, a low-temp. solder and a middle-temp. solder. The two types have different compositions, with the middle-temp solder having the same amounts for Sn, Si, Ni, Zr, Ti and Ce as the low-temp solder, but less P and C in favor of a large amount of Zn.

The Chinese Abstract thus implies that changing the amounts of elements affects the temperature properties of the alloys. It therefore does not follow that the alloys in the Chinese Abstract teach or suggest the claimed alloys and their properties. It is therefore respectfully requested that the rejection of claims 22, 25, and 35-42 over the Chinese Abstract be withdrawn.

Rejection under § 103 over U.S. Patent No. 3,674,471 to Joseph

Regarding claims 22 and 25, Joseph discloses the inclusion of Cr in the brazing alloy. All claims include either "consisting essentially of" or "consisting of" as the transitional phrase, and thus preclude the presence of Cr. Moreover, Joseph does not teach or suggest the temperatures for the solidus, liquidus and major thermal arrest. As shown by the ample evidence submitted to date, variations in composition have a marked affect on the temperature profile. Thus, applicant has proven that the claimed properties are not inherent in the broad teachings of the prior art.

In view of the foregoing remarks, Applicants respectfully believe this case is in condition for allowance and respectfully request allowance of the pending claims. If the Examiner believes any detailed language of the claims requires further discussion, the Examiner is respectfully asked to telephone the undersigned attorney so that the matter may be promptly resolved. The Examiner's prompt attention to this matter is appreciated.

Applicants are of the opinion that no additional fee is due as a result of this amendment. If any charges or credits are necessary to complete this communication, please apply them to Deposit Account No. 23-3000.

Respectfully submitted,

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TABLE A

Alloy	P	Sn	Si	Ni	Ag	Sb	Cu	Liquidus T	Major Thermal Arrest	Solidus T	Comments
A	0.1	25	0.5	0.1	15	0.1	Balance	1284	None	1040	Identical to example in Polish Abstract
B	1	6	0.5	0.1	15	0.1	Balance	1669	None	1045	Within Polish ranges; P content below claimed range
C-1	3	6	0.5	0.1	15	0.1	Balance	1464	1130	1046	Within Polish ranges; P content just below claimed range
C-2	3	6	0.5	0.1	0	0.1	Balance	1671	1225	1160	Within Polish ranges, but no Ag; P content just below claimed range
D-1	6	11	0.5	0.1	15	0.1	Balance	1305	1106	1046	Within Polish ranges; P within claimed range, but Sn just above claimed range
D-2	6	11	0.5	0.1	0	0.1	Balance	1293	1199	1177	Within Polish ranges, but no Ag; P within claimed range, but Sn just above claimed range
E	6	4	0.5	0.1	15	5	Balance	1215	None	1165	Within Polish ranges; High Sb content—above claimed range
F	6	8	0.5	0.1	15	3	Balance	1352	None	1091	Within Polish ranges; Sb + Sn > 10%—above claimed range
G	11	9	0.5	0.1	15	5	Balance	1584	None	??	Within Polish ranges; P, Sb, Sn+Sb above claimed range
H-1	11	6	0.5	0.1	15	0.1	Balance	1620	None	1069	Within Polish ranges; P above claimed range, Sn within range (opposite D-1)
H-2	11	6	0.5	0.1	0	0.1	Balance	1677	1164	1037	Within Polish ranges, but no Ag; P above claimed range, Sn within range (opposite D-2)
I	4	8	0.5	0	0	0	Balance	1467	1227	1179	Within claimed range: Near lower limit of P and upper limit for Sn for claimed range: Results for invention near endpoints
J	10	1	0.5	0	0	0	Balance	1503	None	1308	Within claimed range: Near upper limit of P, lower limit for Sn for claimed range: Results for invention near endpoints
K	6.7	6.65	0.15	0	0	0	Balance	1256	None	1179	Within claimed range: Exemplary embodiment

4A	5	6	0.02	5	15	0	Balance	1343	1293	1037	
5A	5	6	0	5	15	0	Balance	1352	1211	1037	
6A	5	6	0.02	6	15	0	Balance	1352	1205	1038	
7A	5	6	0.02	7	15	0	Balance	1353	1251	1034	
8A	5	6	0.02	8	15	0	Balance	1384	1296	1034	
9A	5	6	0.015	6	15	0	Balance	1404	1212	1056	
10A	7	6	0.015	6	6	0	Balance	1240	1114	1037	
11A	5	6	0.015	6	0	0	Balance	1134	None	1134	
12A	7.1	6	0	1	0	0	Balance	1241	None	1241	
13A	7.1	6	0	3	0	0	Balance	1264	1210	1098	
14A	7.1	6	0	5	0	0	Balance	1290	1178	1116	
15A	7.1	6	0	8	0	0	Balance	1359	1133	1098	
2B	6.7	2	0.02	2	0	0	Balance	1460	1253	1110	
3B	6.7	5	0.02	2	0	0	Balance	1344	1229	1102	
4B	6.75	2	0.1	0	0	1	Balance	1389	None	1285	

5B	6.7	6.6	0.02	1	0	0	Balance	1253	None	1237	
6B	6.7	6.6	0.02	1.4	0	0	Balance	1269	1239	1090	
7B	6.7	6.6	0.02	1.8	0	0	Balance	1279	1223	1093	
8B	6.7	6.6	0.02	2	0	0	Balance	1280	1215	1090	
9B	6.75	2	0.1	0	3	2	Balance	1296	None	1238	
10B	6.7	6.2	0.02	1.5	3	0	Balance	1226	1201	1033	
11B	7	2	0.02	2	2	0	Balance	1458	1246	1128	
13B	6	6	0.02	2	6	0	Balance	1288	1160	1060	
15B	5	6	0.02	2	15	0	Balance	1260	1127	1030	
16B	6	6.7	0.02	2	15	0	Balance	1107	None	1028	
17B	6	6	0.02	2	18	0	Balance	1118	None	1028	